

PINEMAP's DSS: Past, Present, and Future

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Athens, GA

These are drop down menu topics



Get Started -
Novice

Advanced
User View

Tools & Tips

PINEMAP
Concepts



Get Started → Stand Parameters: Location

Observation Time

◀ Previous Day
(Aug 26 at 4 pm) ◀ Previous Hour
(Today at 3 pm) Currently Viewing
(Today at 4 pm)

Most current ob (Today at 4 pm) Custom date/time

Location

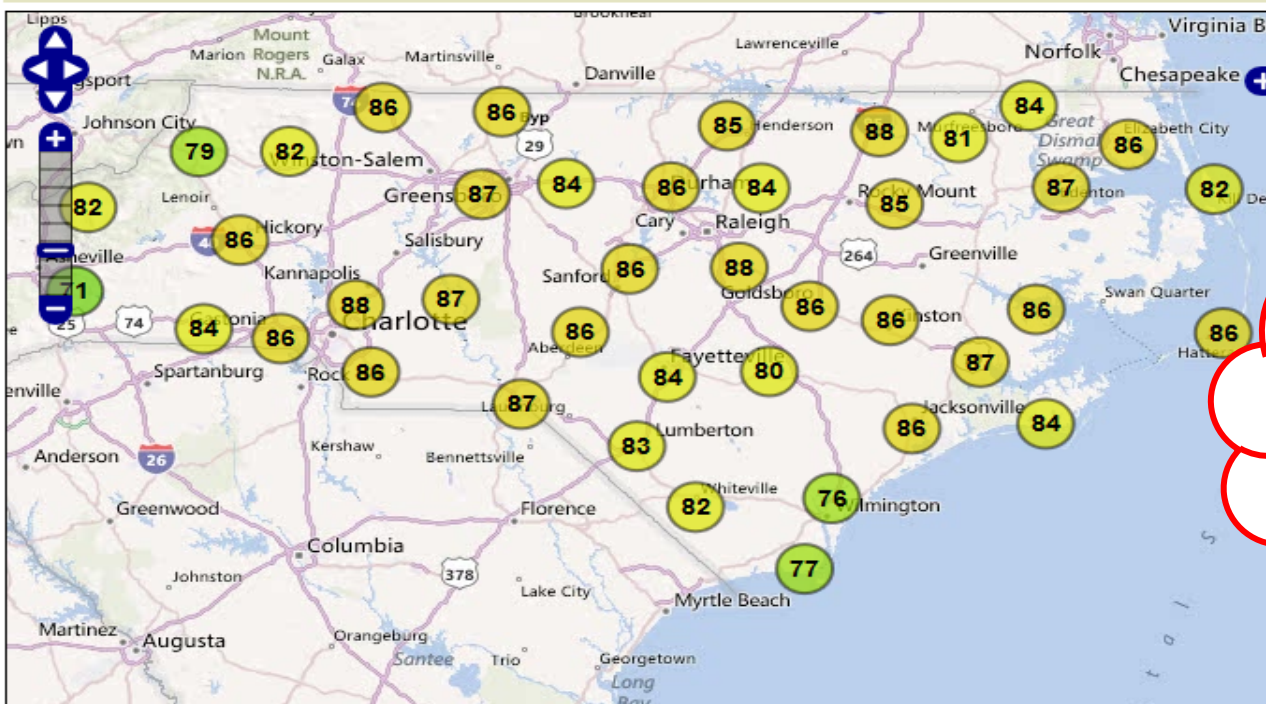
Use my current zoom level & location
 Zoom to a state Zoom to a county

Point Data

Show one parameter
Air temperature
 Show four parameters

Gridded Data

MPE: Diff. from normal precip.



Air temperature (°F) -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120



Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by USDA National Institute of Food and Agriculture.



Choose Your Location of Interest

Step 1: Choose your location of interest by clicking on the map. The native loblolly pine range is outlined in green.



OR Enter your own latitude and longitude values here:

Latitude: and Longitude: NOTE: Use negative values for west longitudes.

OR Enter your own location information here:

Location: NOTE: Location can be an address, zip code, or city/county and state (eg. Raleigh, NC).

Step 2: Stand Progression - Where is your stand in life?

- New Stand
- Existing Stand
- Not Sure

Step 2a: What is the species mix?

What is the age?

What is the density?

Have you done past management? If yes, what type?

Step 3: For more information about this location and for guidance on decisions related to establishment, intermediate stage, and regeneration at this site, click this

button:

Latitude: 35.210844
Longitude: -77.563477
Soil Group: CRIFF C
Stand Progression: Existing Stand

Average Annual Extreme Minimum Temperature: 15°F
Average Annual Precipitation: 46.4inches
Current US Drought Monitor Intensity: Moderate

Historical Environmental Conditions

To view the tools in each category, click on the title.

Weather and Climate

- **What is the weather and climate like?**
Research/Tools: PRISM data at tier sites
- **What are the rain patterns including timing of the rain?**
Research/Tools: PRISM data at tier sites
- **What are the temperatures including nighttime temperatures?**
Research/Tools: PRISM data at tier sites
- **What are the seasons -- e.g. start and end periods for frost/freezes, growing season, etc.?**

Soils

Other environmental conditions

Markets

Productivity

Other

planting, site prep,
vegetation control,
nutritional management,
ecosystem services,
harvest, etc.

Fall
2013

Location Currently set to near Lake Butler, FL. [\(hide details\)](#)

Choose a stand location by clicking on the map:



OR enter your location:

Details for your submitted location:

Latitude & Longitude:

▲ 29.96°N 82.44°W

Closest Tier 1 Site:

◆ Site 1 near Lake City, FL
(14.9 miles away)

Avg. Extreme Min. Temperature:

(avg. annual minimum temp. from 1979 to 2011)

20°F

Avg. Annual Precipitation:

52.8 inches

Current Drought Intensity:



▲ No drought

(for 100% of Union County as of Feb 18)

Winter
2013-14

[Historical Conditions](#)

[Possible Future Pressures](#)

[Establishment Decisions](#)

[Intermediate Decisions](#)

[Regeneration Decisions](#)

Weather and Climate

Soils

Other Environmental Conditions

Productivity

Other

Choose a question from one of the categories and subcategories in the menus above.

[Are we in a drought?](#)

[Is there ample moisture in the soil?](#)

[What are the weather conditions \(temperature, wind speed, etc.\) now and for the next 1-3 months?](#)

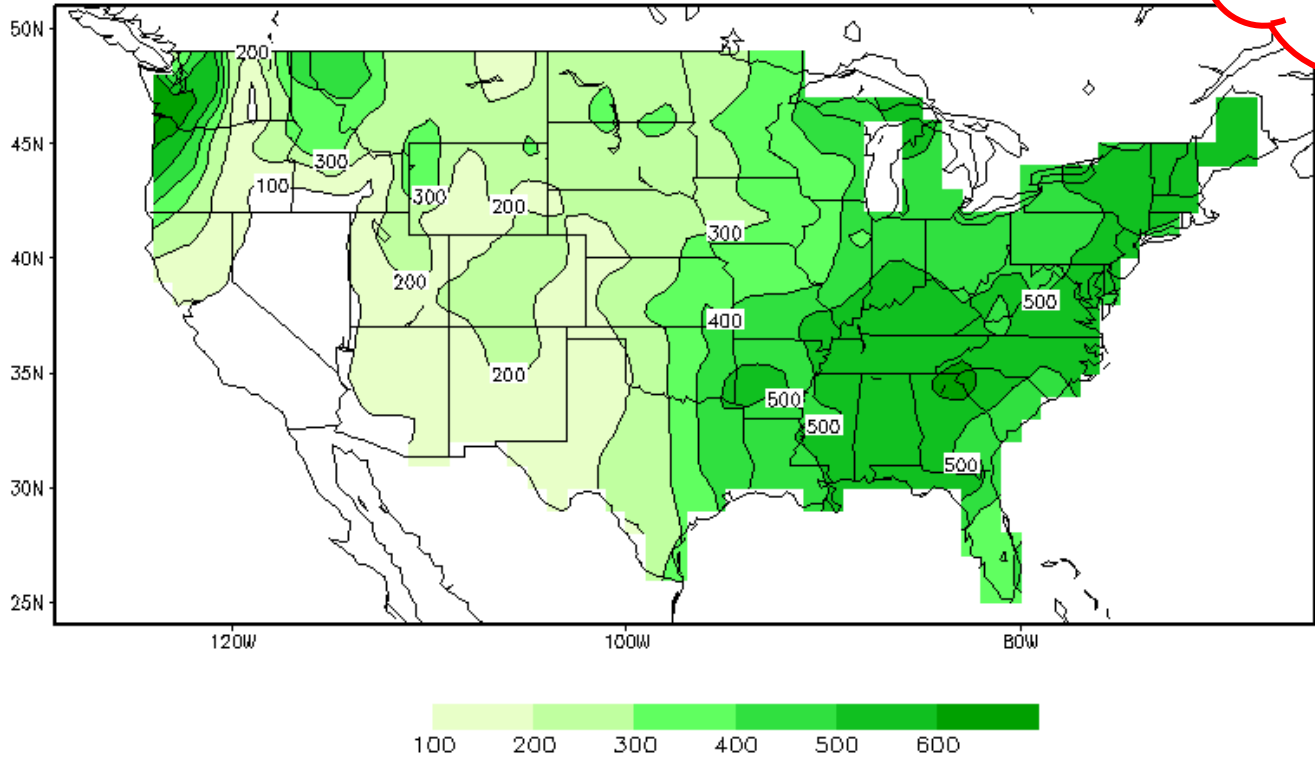
[If I plant in the next 1-3 months, what is the chance of failure and replanting?](#)

Clicking here populates content below

Establishment Decisions » Current Environmental Conditions » **Is there ample moisture in the soil?**

Here are the current values of soil moisture according to the Climate Prediction Center:

Calculated Soil Moisture (mm)
JAN 30, 2014



**Winter
2013-14**

Environment

Establishment

Management

Production

Temperature

Precipitation

Drought

Other Weather Conditions

Soils

Water

Select a tool:

Historical dataset (1986 to 2005):

Observations

Model baseline data

Future projections:

Period:

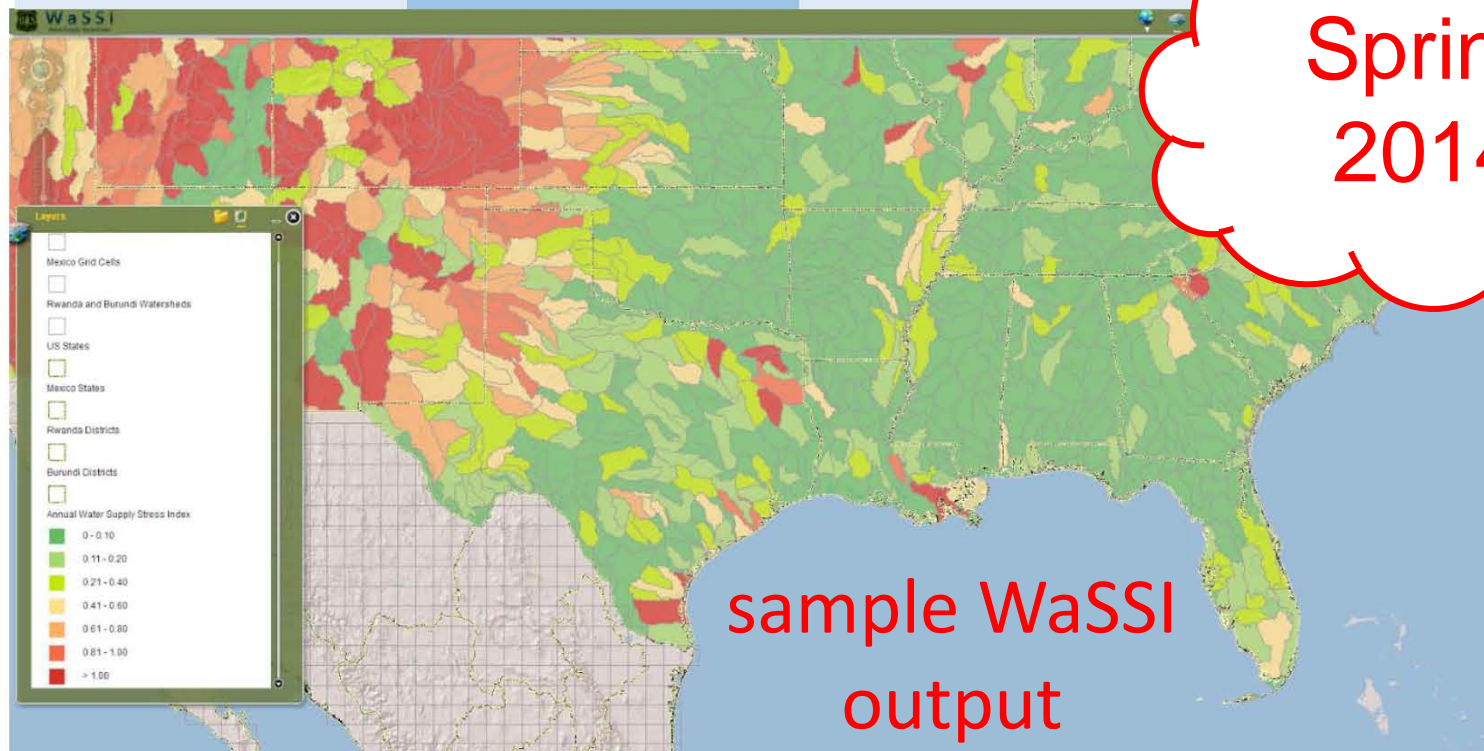
Output:

RCP scenario:

Minimum projected change

Mean projected change

Maximum projected change



Spring
2014

sample WaSSI
output

Other Resources:

 [Water Supply Stress Index Fact Sheet](#)

 [Background: WaSSI](#)



PINEMAP

Mapping the future of southern pine management

Environment Establishment Management **Production**

Carbon Sequestration **Tree Production** Markets

Select a tool: Growth & Yield Model: Green Weight

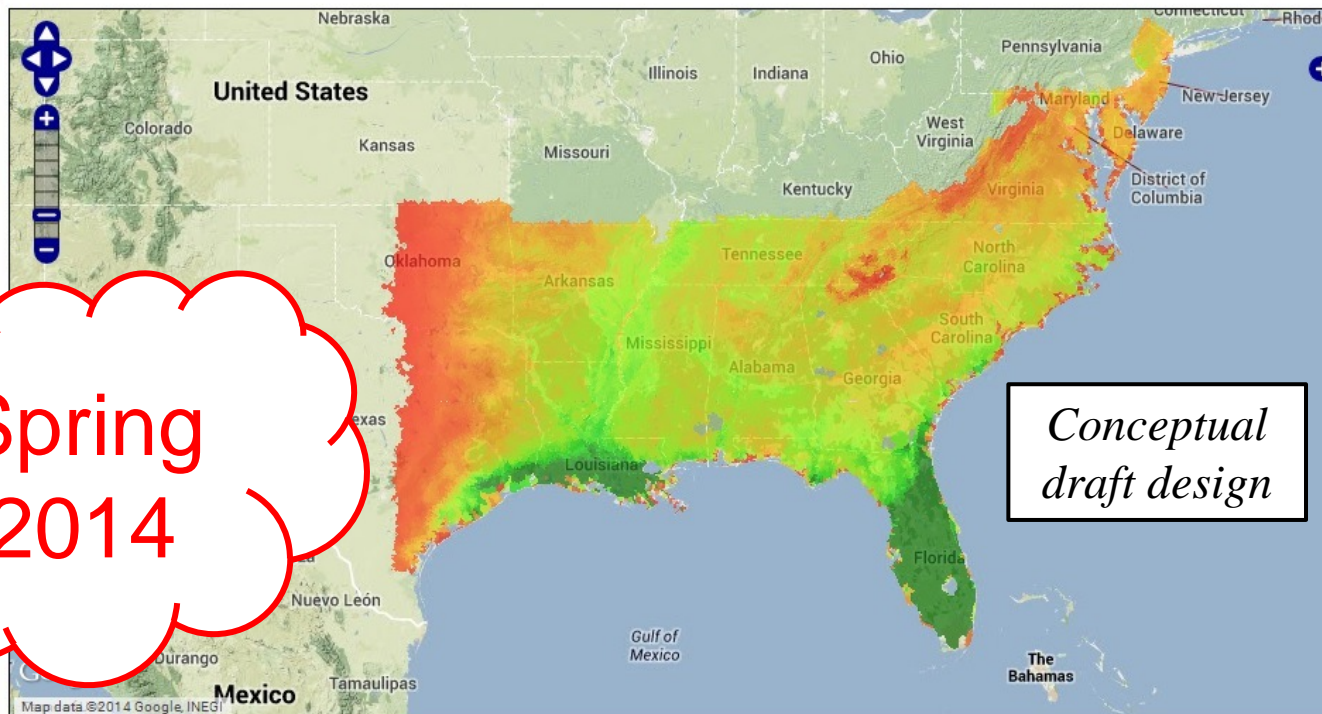
Year: 2014

Display

RCP scenario: Intense (8.5)

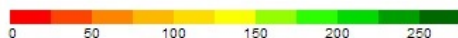
Management scenario: Baseline (control)

How does future climate influence pine productivity?



Spring 2014

Green weight (tons per acre)



Other Resources

Virginia Tech's Forest Modeling Research Cooperative
For more information on this data, contact [Dr. Harold Burkhart](#) at Virginia Tech University.

Select a tool: Extreme minimum temperature frequency

Historical dataset (from 1986 to 2005):

- Observations
- Model baseline data

Future projections:

Period: 2061 to 2080

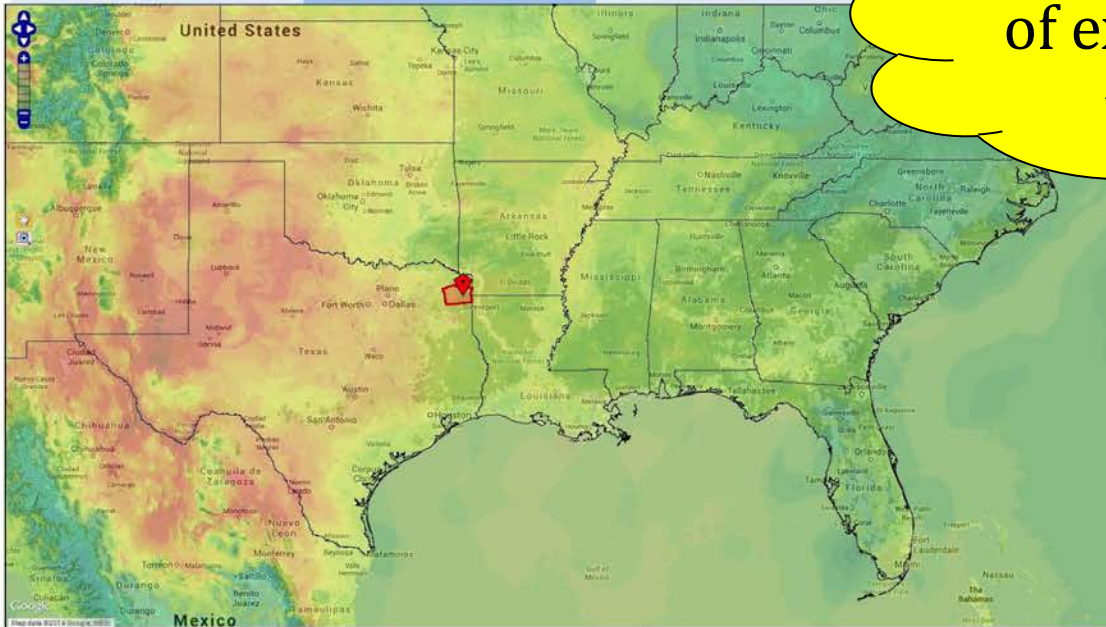
Temp. threshold: 20°F

Season: Winter (DJF)

RCP scenario: 4.5

Display

Minimum projected change Mean projected change Maximum projected change



Mean projected change in days per year with minimum temperatures < 20°F for the period from 2061 to 2080 (reference period: 1986 to 2005)

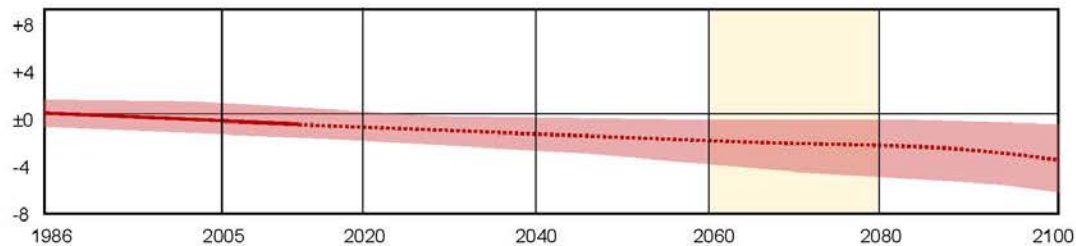


At your location:

Region: Cass County, TX

Baseline: 12 ± 3.2 days

Projected Change: -2.8 ± 2.1 days



What are projections of extreme minimum temperature?

Spring 2014

Prototype: Extreme Min Temp Risk Tool

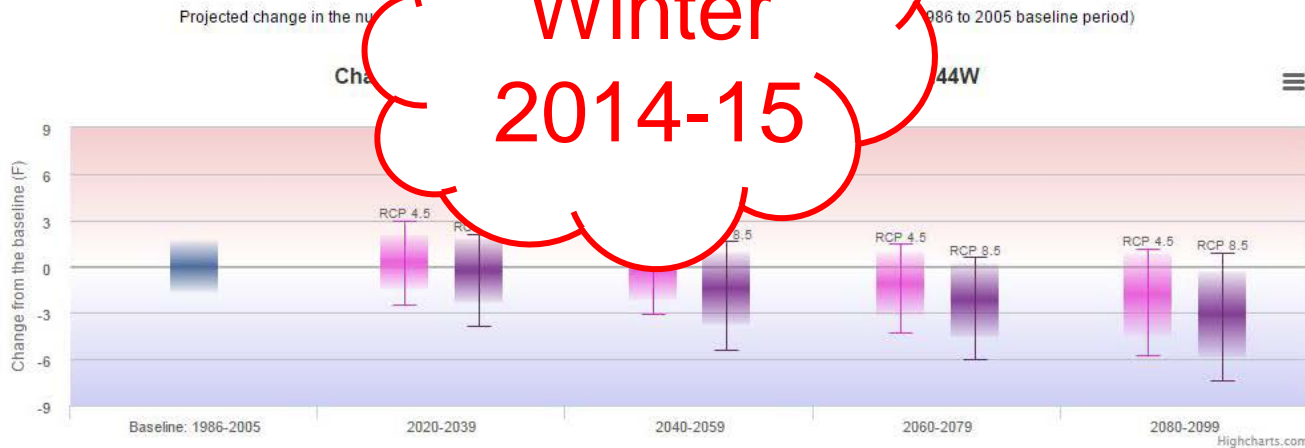
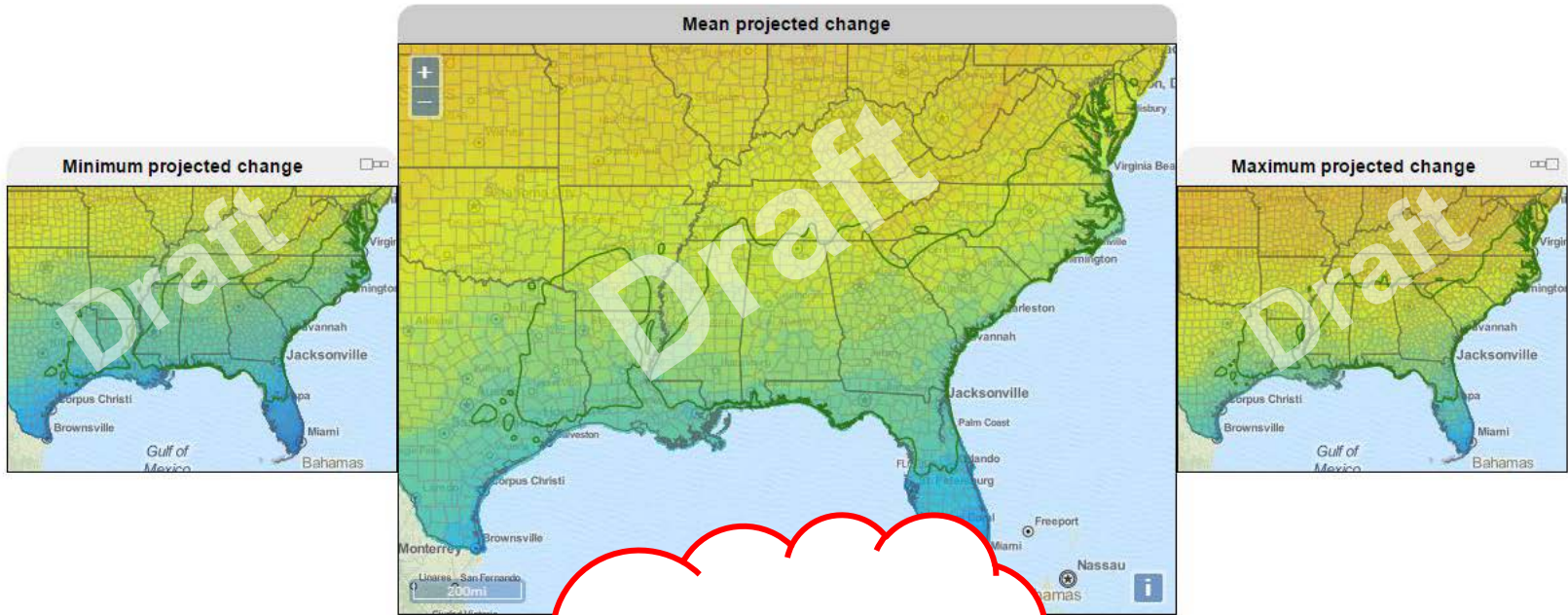
Select a tool: Extreme minimum temperature risk

View historical conditions
Baseline period: 1986 to 2005

View future projections
Time Slice: 2060-2079
RCP scenario: Intense (8.5)

Temp. threshold: 32°F

Display



Extreme Minimum Temperature Risk

Temperature threshold: 32°F

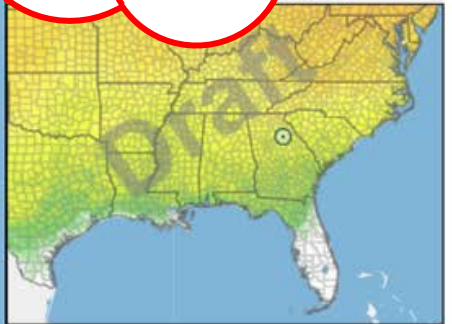
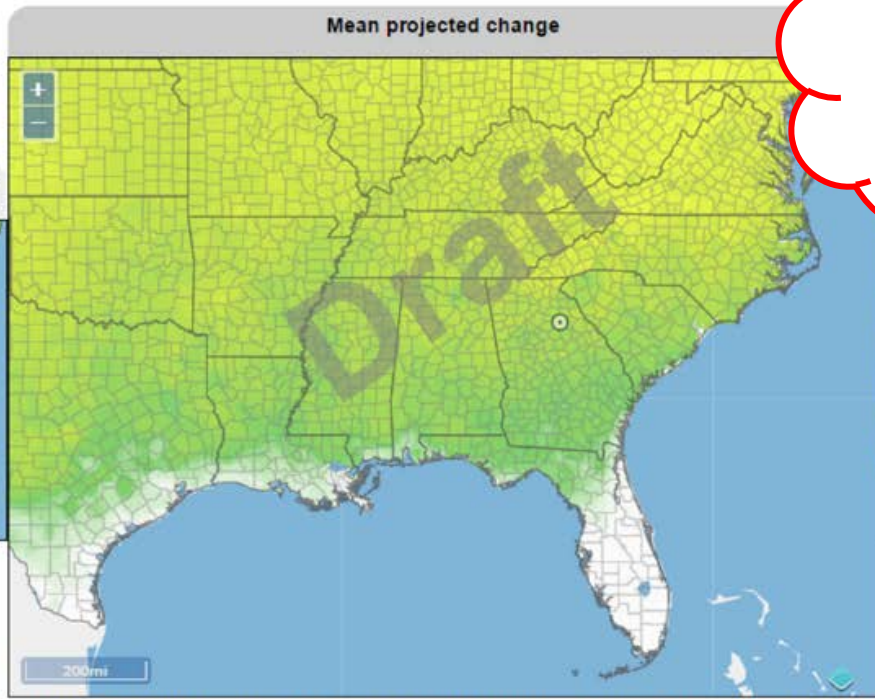
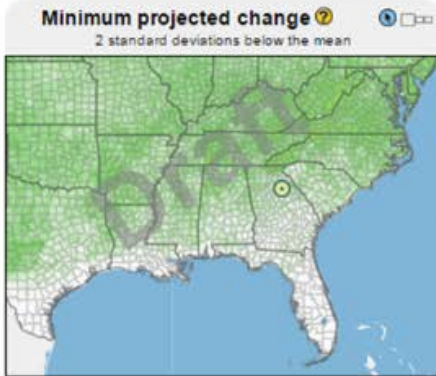
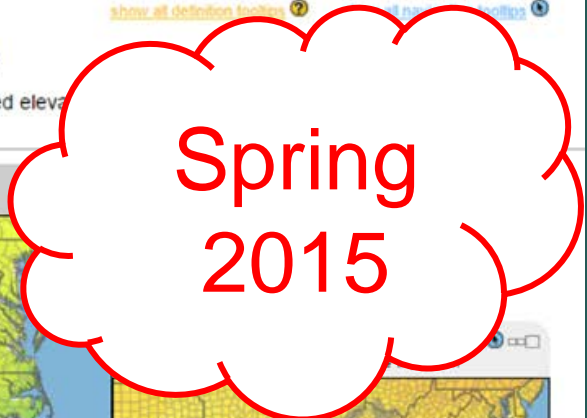
Future time slice: 2040 to 2059

Climate change scenario: Intense warming

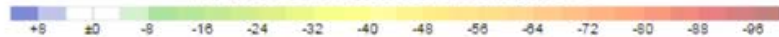
Selected location: 33.9°N 83.41°E (near Athens, GA 30606, USA)

Map layers: County lines Native loblolly range Shaded elevation

[show all definition tooltips](#)

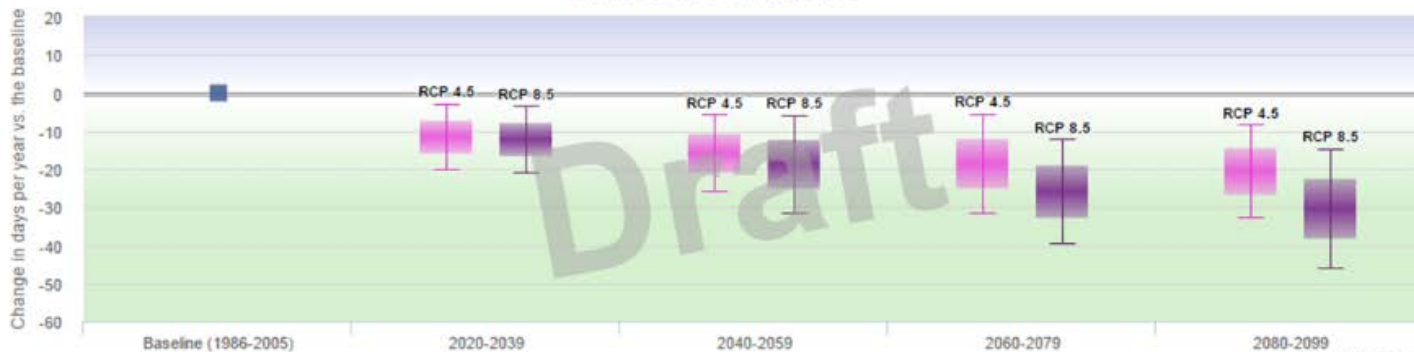


Projected change in the number of days per year with minimum temperatures $\leq 32^\circ\text{F}$ for the 2040 to 2059 period (compared to the 1985 to 2005 baseline period)



Change in the number of days per year with minimum temperatures $\leq 32^\circ\text{F}$ near Athens, GA 30606, USA

Historical average: 10 days per year



Extreme Minimum Temperature [\(more information about this tool\)](#)

[show all tooltips](#)

Temperature Threshold: 32°F

Map Display: Historical Average Projected Change Projected Average
(Historical Average + Projected Change)

Future Time Slice: 2060 to 2079

Future Emissions: Current Levels (High)

Projected Change in the Average Number of Days Per Year with Minimum Temperature

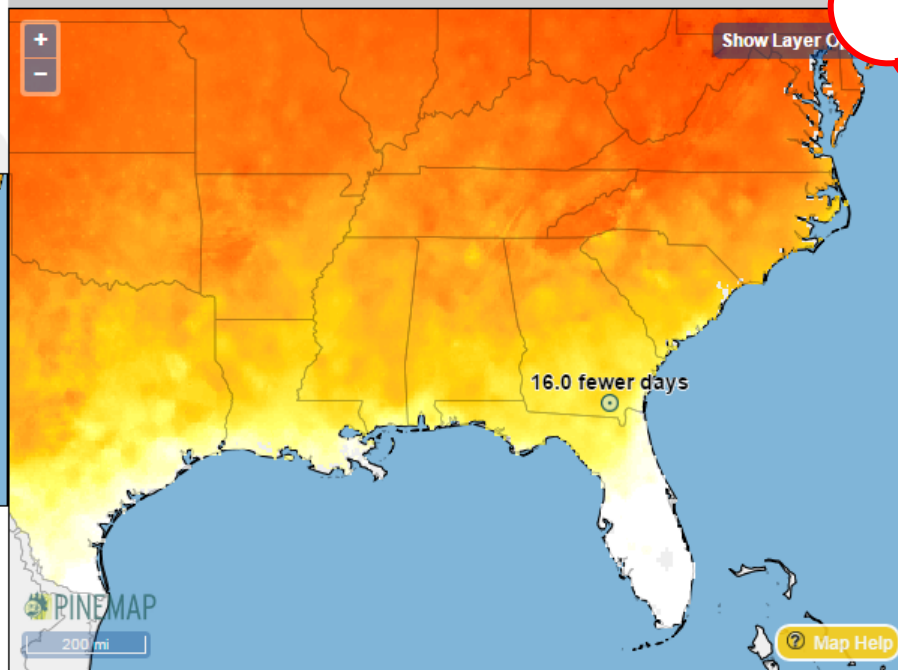
Time Period: 2060 to 2079 (compared with 1950 to 2005) Future Emissions: Current Levels



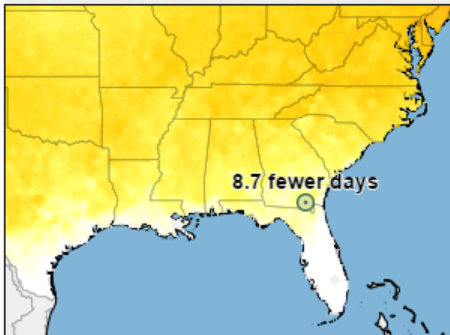
Location: In Clinch County, GA (30.93°N 82.53°W)

To select a location, click on the map or enter your coordinates: 30.93 °N, 82.53 °W

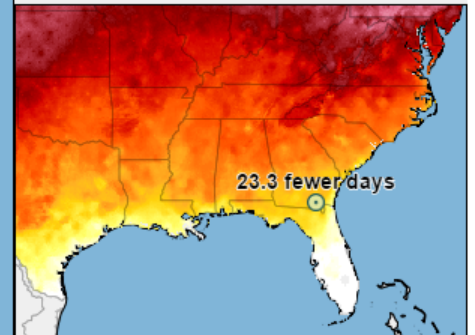
Mean Projected Change



Minimum Projected Change



Maximum Projected Change



Fall
2015

Prototype: Seed Deployment Tool

Athens, GA

RCP 8.5

Winter
2014-15

Select a tool: Seed Deployment Tool

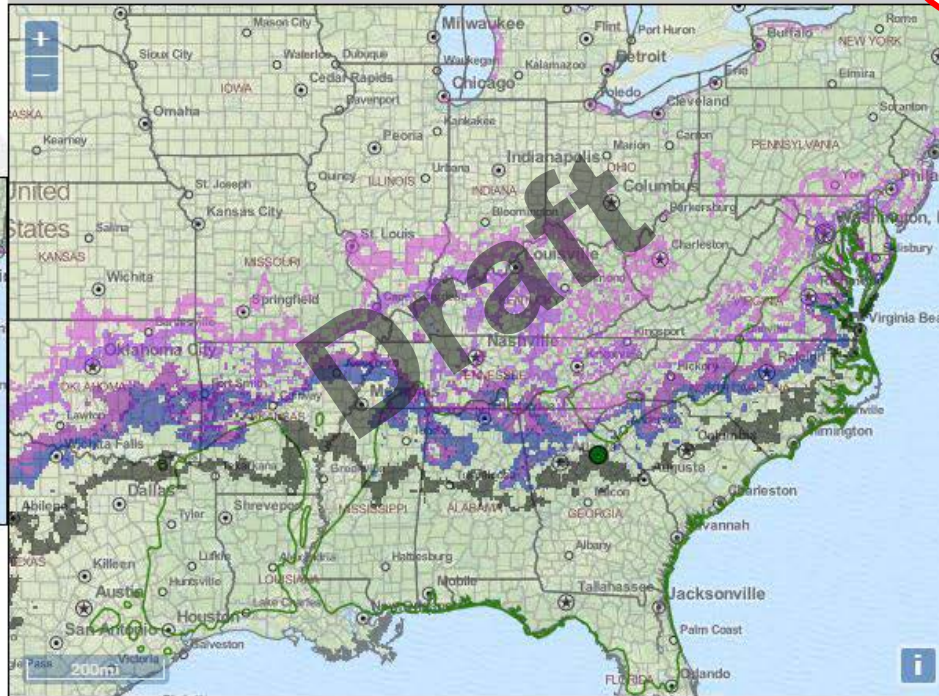
RCP scenario: Intense (8.5)

Display

Mean value

2 std. deviation below the mean

2 std. deviation above the mean



Black: historical

Blue: 2020-2039

Purple: 2040-2059

Lt Purple: 2060-2079

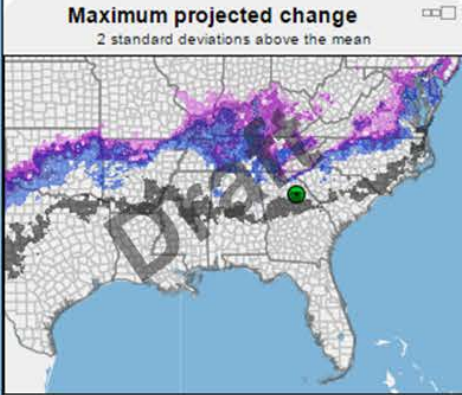
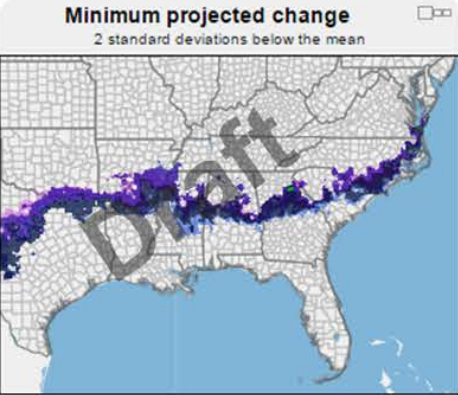
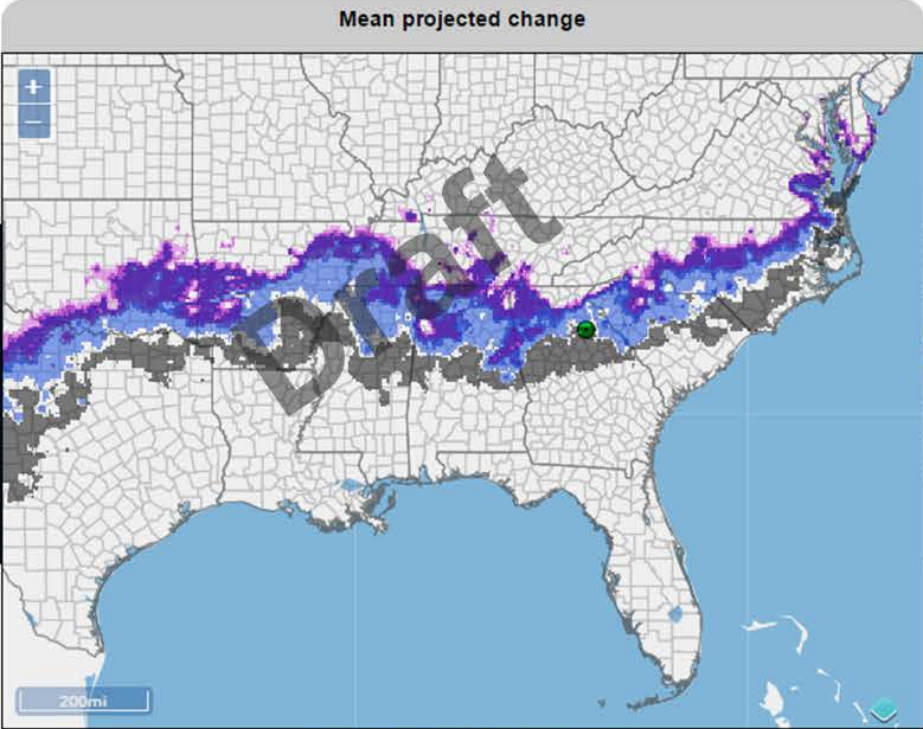
Pink: 2080-2099

Spring
2015

Seed Movement Tool

Map display:
 Historical isotherms
 Projected isotherms
RCP scenario: Moderate (4.5)

Selected location: 33.97°N 83.41°W (near Athens, GA 30606, USA)
Map layers: County lines Native loblolly range Elevation base map



- Current and projected 33.4°F isotherms
- Baseline (1986-2005) [\(show details\)](#)
 - 2020-2039 projection [\(show details\)](#)
 - 2040-2059 projection [\(show details\)](#)
 - 2060-2079 projection [\(show details\)](#)
 - 2080-2099 projection [\(show details\)](#)

Current and projected seedling source ranges for your selected location

Seedling source for current stands
[show 5° risk range](#)

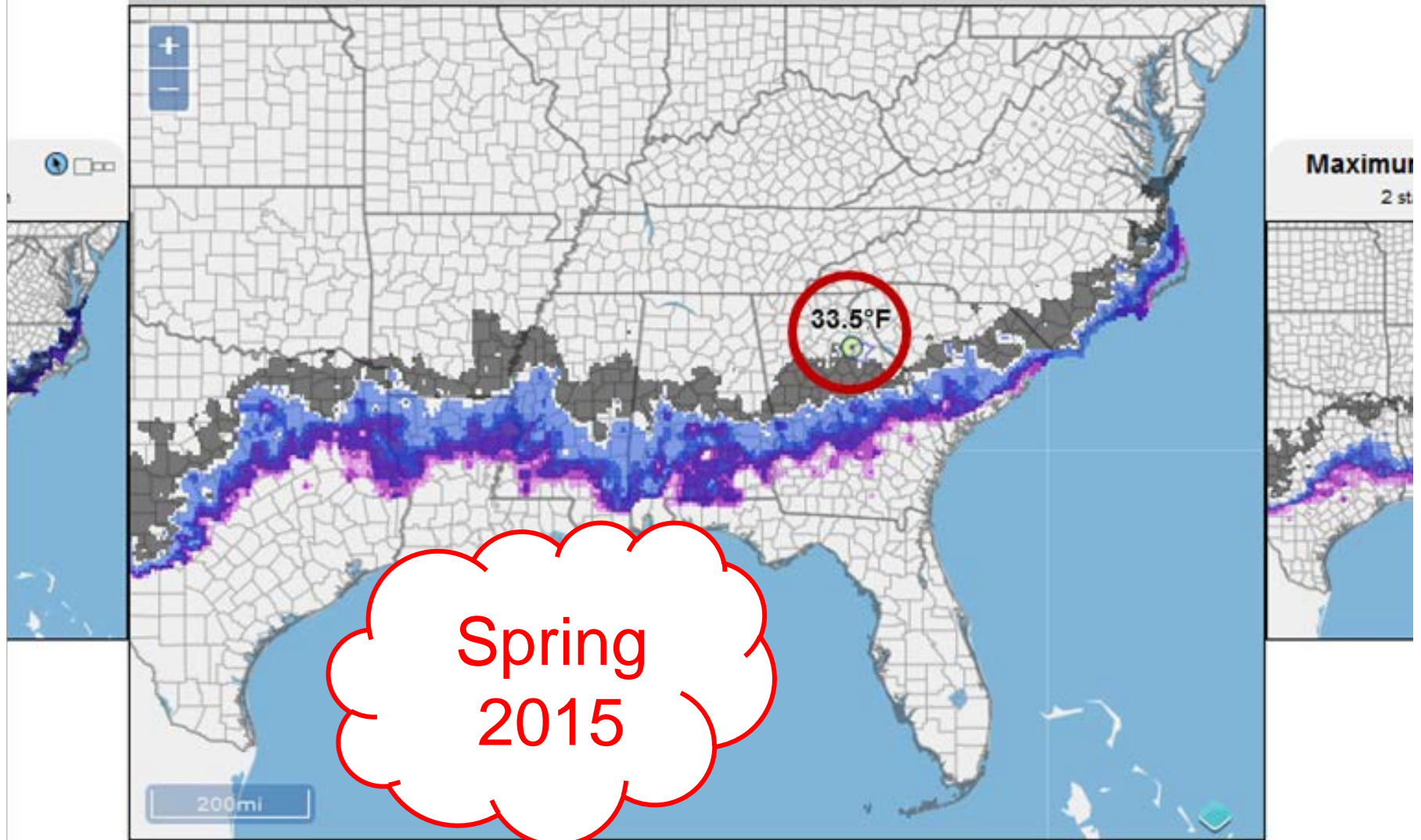
Seedling source for a 20-year stand
[show 5° risk range](#)

Seedling source for a 40-year stand
[show 5° risk range](#)

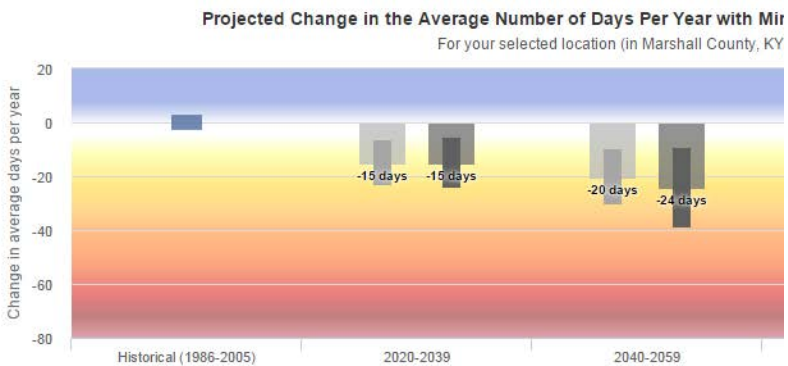
Seedling source for a 60-year stand
[show 5° risk range](#)

Seedling source for an 80-year stand
[show 5° risk range](#)

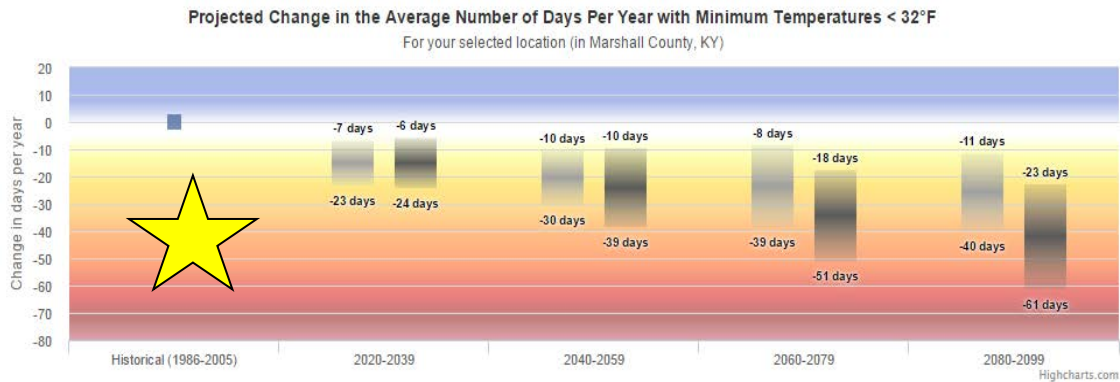
Mean projected change



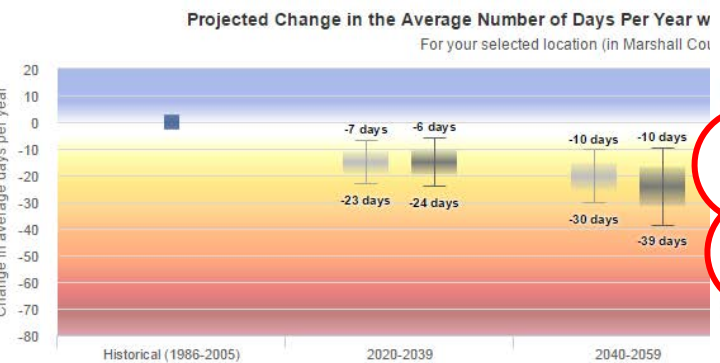
A



B

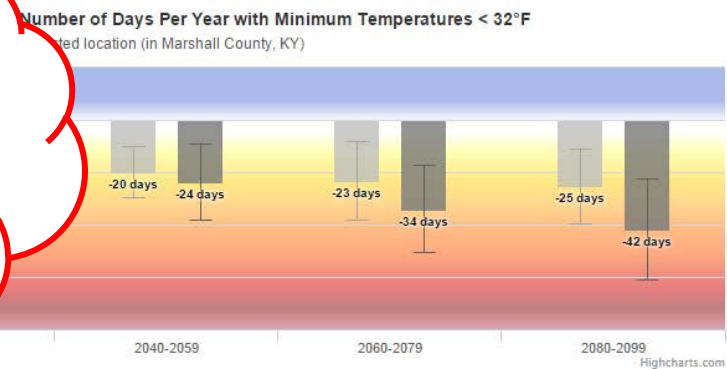


C

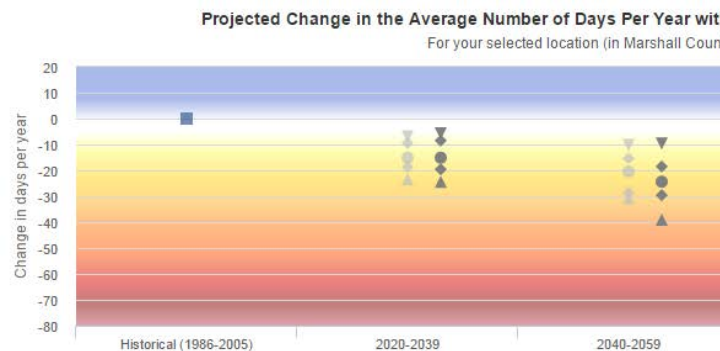


D

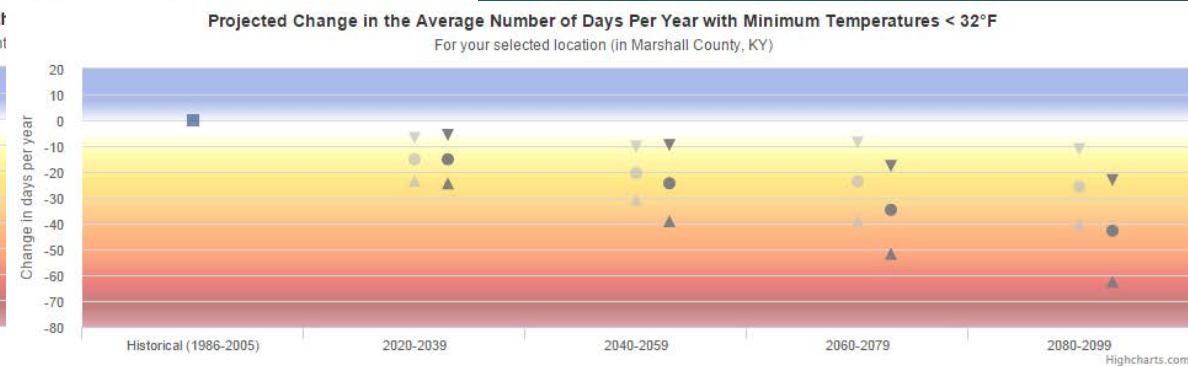
Summer
2015

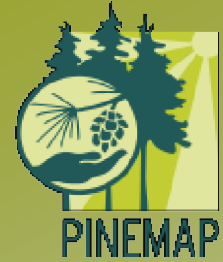


E



F





Eye Tracking Study

- Conducted by researchers from NCSU Geocognition lab
- At the **Appalachian Society of American Foresters meeting** on Jan. 28-29 in Durham, NC
- **31 participants** ranging from young to old, students to state, federal forestry to private, non-profit forestry



Example Eye Tracking Heat Map

HeatMap
Draw: 606000µs
FPS: 1
0 49.26
counts

Summer Precipitation

FAQ: What can this tool be used for?
(click to view the answer)

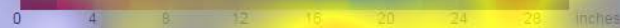
hide FAQs expand tooltips

Map Display: Historical Average Projected Change Projected Average
(Historical Average + Projected Change)

Future Time Slice: 2020 to 2039
Future Emissions: Current Levels (High)

Projected Average Summer (June - August) Precipitation

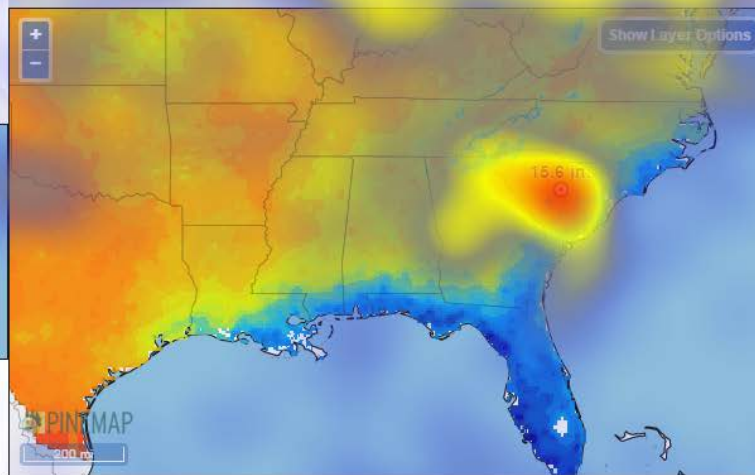
Time Period: 2020 to 2039 (compared with 1950 to 2005) Future Emissions: Current Levels (High)



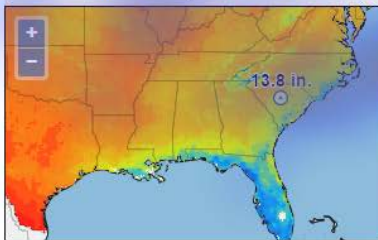
Location: In Richland County, SC (34.03°N 80.9°W)

To select a location, click on the map or enter your coordinates: 34.03 °N 80.9 °W Go

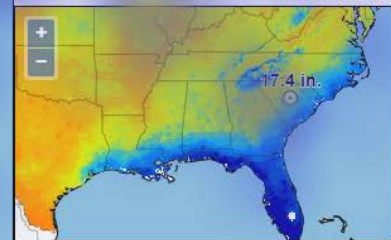
Multi-Model Mean



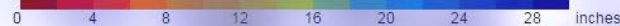
Lowest Likely Outcome



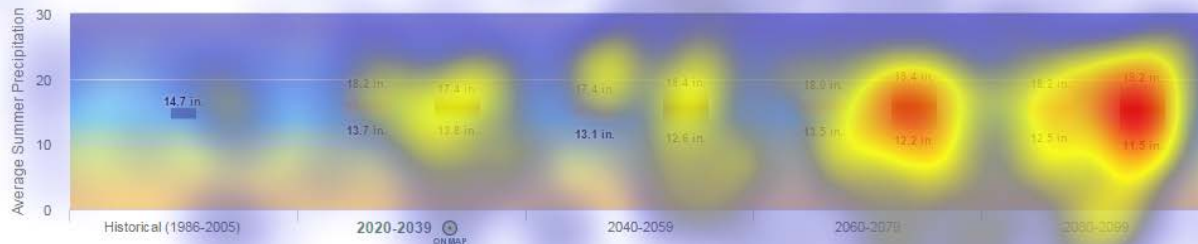
Highest Likely Outcome



Average Summer (June - August) Precipitation

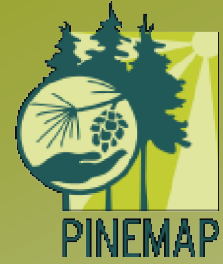


Location: In Richland County, SC (34.03°N 80.9°W)



FAQ: What does this graph show?
(click to view the answer)

- Historical average
- Likely outcomes under reduced/moderate emissions
- Likely outcomes under current/high emissions



Usability Issues Identified

- Users read text in an F pattern

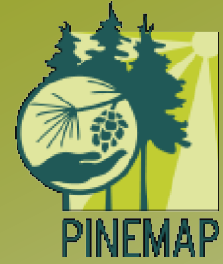
DSS Introduction

The guide below describes the features of the PINEMAP Decision Support System. Once you're ready to begin using the DSS, select a tool using the matrix above.

1. Fundamentals
2. Data
3. Climate
4. Three-Map Layout
5. Tim Series

- The PINEMAP Decision Support System (DSS) is a web-based tool that allows you to study the effects of different management scenarios on the growth and survival of pine trees.
- The DSS also includes a variety of tools that allow you to analyze the results of your simulations and to compare them with real-world data.
- The DSS is designed to be easy to use and to provide a clear and concise overview of the results of your simulations.





Usability Issues Identified

- Embedded help was underused

PINEMAP DECISION SUPPORT SYSTEM v1.1 About Environment Establishment Management Production

Summer Precipitation

FAQ: What can this tool be used for? (click to view the answer)

Map Display: Historical Average Projected Change Projected Average (Historical Average + Projected Change)

Future Time Slice: 2020 to 2039 Future Emissions: Current Levels (High)

Projected Average Summer (June - August) Precipitation

Time Period: 2020 to 2039 (compared with 1950 to 2005) Future Emissions: Current Levels (High)

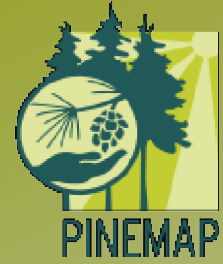
0 4 8 12 16 20 24 28 inches

Location: none selected
To select a location, click on the map or enter your coordinates: Latitude

Multi-Model Mean

Lowest Likely Outcome

	FAQ Boxes	Tooltips
Yes	5	3
No	26	28



Usability Issues Identified

- Map layer options and overlays weren't clearly visible



DECISION SUPPORT SYSTEM

About

Environment

Establishment

Management

Production

Summer Precipitation

[? About This Tool](#)

Map Display

- Historical Observed Projected Change Projected Average
(Historical Observed + Projected Change)

Future Time Period 2020 to 2039

Future Emissions Current Levels (High)

Projected Average Summer (June - August) Precipitation

Time Period: 2020 to 2039 (compared with 1950 to 2005) Future Emissions: Current Levels (High)



Location: none selected

To select a location, click on the map or enter your coordinates: Latitude *N, Longitude *W Go

[? Map Help](#)

[? About the Side Maps](#)

Multi-Model Mean

What do the side maps show?

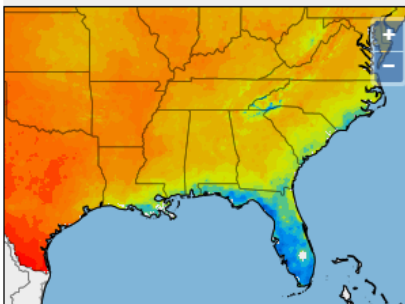
The side maps show projections 2 standard deviations below and above the multi-model mean, or the 2.5th and 97.5th percentiles. This represents the likely spread in future outcomes.

Layer Options

- County lines
- HUC 12
- Lakes and rivers
- Roads and cities
- Native loblolly range

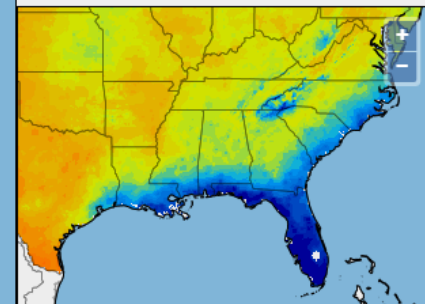
Lowest Likely Outcome

[ENLARGE](#)

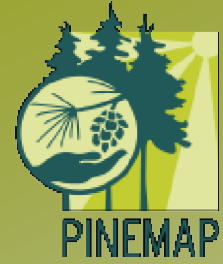


Highest Likely Outcome

[ENLARGE](#)



200 mi



Usability Issues Identified

- Location selection, time series availability were not obvious

PINEMAP

DECISION SUPPORT SYSTEM

About

Environment

Establishment

Management

Production

Minimum Temperature Thresholds

[? About This Tool](#)

Temperature
Threshold

32°F

Map Display

Historical Observed

Projected Change

Projected Average

(Historical Observed + Projected Change)

Historical Observed Number of Days Per Year with Minimum Temperatures < 32°F

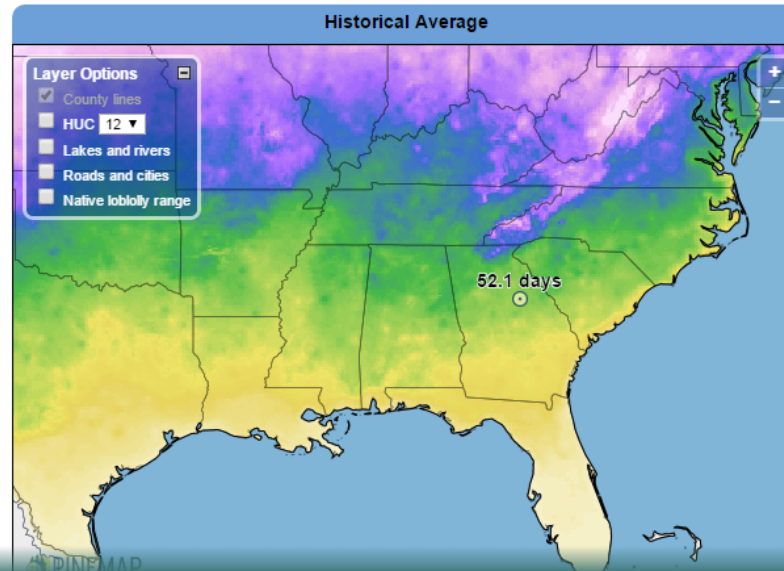
Time Period: 1986 to 2005

0 20 40 60 80 100 120 140 days

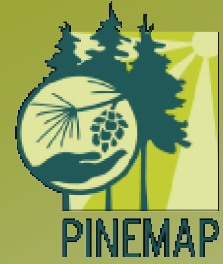
Location: In Greene County, GA (33.5°N 83.14°W)

[? Map Help](#)

To select a location, click on the map or enter your coordinates: °N, °W



Time series data for your location has loaded below



Usability Issues Identified

- Users couldn't get to end goal of seedling deployment tools

Cold-Tolerant Markets for Nurseries [? About This Tool](#)

Seedling Markets

[FAQ: What can this tool be used for?](#)
(click to view the answer)

[hide FAQs](#) [expand tooltips](#)

Map Display: Historical Temperatures Projected Temperatures | Future Emissions: [?](#)

Current and Projected 11.8°F Temperature Ranges

Future Emissions: [?](#)

- | | | | | | | |
|---|---|---|---|---|---|---|
| <input checked="" type="checkbox"/> Historical (1986-2005)
show 5° range | <input checked="" type="checkbox"/> 2010-2029 projection
show 5° range | <input checked="" type="checkbox"/> 2020-2039 projection
show 5° range | <input checked="" type="checkbox"/> 2030-2049 projection
show 5° range | <input checked="" type="checkbox"/> 2040-2059 projection
show 5° range | <input checked="" type="checkbox"/> 2060-2079 projection
show 5° range | <input checked="" type="checkbox"/> 2080-2099 projection
show 5° range |
|---|---|---|---|---|---|---|

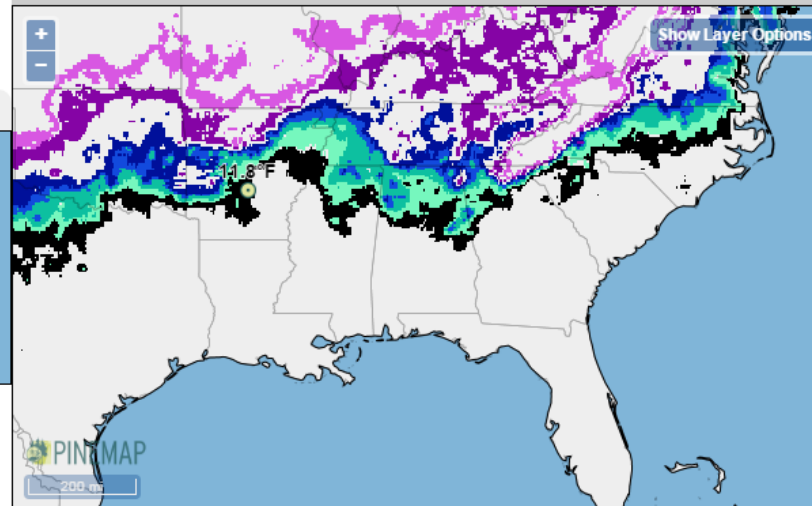
[FAQ: How do I use the maps?](#)
(click to view the answer)

[FAQ: What do the side maps show?](#)
(click to view the answer)

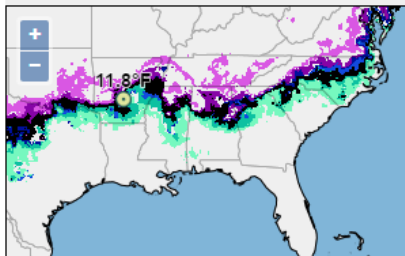
Location: In Grant County, AR (34.33°N 92.5°W)

To select a location, click on the map or enter your coordinates: °N, °W

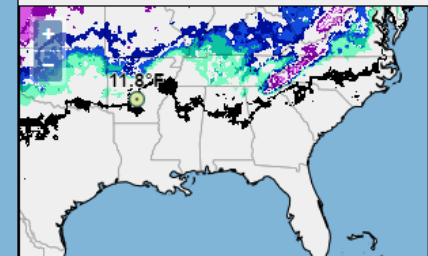
Multi-Model Mean



Lowest Likely Temperatures



Highest Likely Temperatures

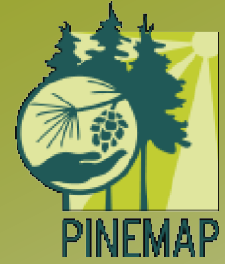


7°F 8°F 9°F 10°F 11°F 11.8°F 13°F

* This is your location's historical average annual minimum temperature

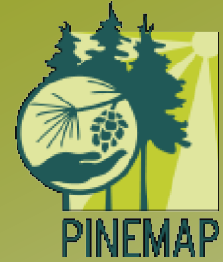
7°F 8°F 9°F 10°F 11°F 11.8°F 13°F

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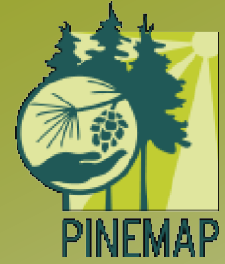
Today's DSS

- Live demo



Coming by end of the summer?

- Growing season length
- Forest productivity model outputs
 - gross and net primary productivity
 - net ecosystem productivity
 - merchantable volume
 - carbon above ground
 - water stress
- Market and link to existing tools (help!)
- Others?



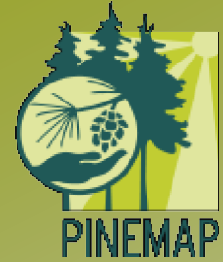
BREAK for questions

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agricultural Project funded by the USDA National Institute of Food and Agriculture



United States
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Agriculture

National Institute
of Food and
Agriculture



Migrating research outputs into the DSS

- Example with Summer Dryness Index tool

PINEMAP

Summer Dry

Map Display His

About **Environment** **Establishment** **Management** **Production**

Temperature

Minimum Temperature Thresholds
View projected changes in the occurrence of minimum temperatures below different thresholds

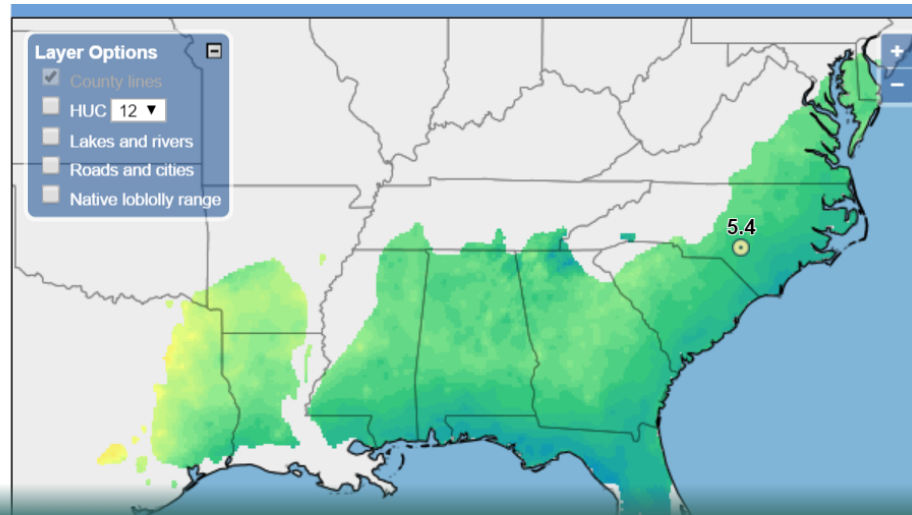
Summer Temperature
View projected changes in average summertime temperatures

Precipitation

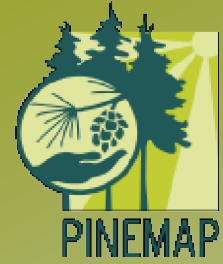
Summer Precipitation
View projected changes in average summertime precipitation

Drought

Summer Dryness Index
View projected changes in the ratio of summer growing degree days to summer precipitation



Time series data for your location has loaded below



Migrating research outputs into the DSS



DECISION SUPPORT SYSTEM

About

Environment

Establishment

Management

Summer Dryness Index

[? About This Tool](#)

Map Display

Historical

What can this tool be used for?

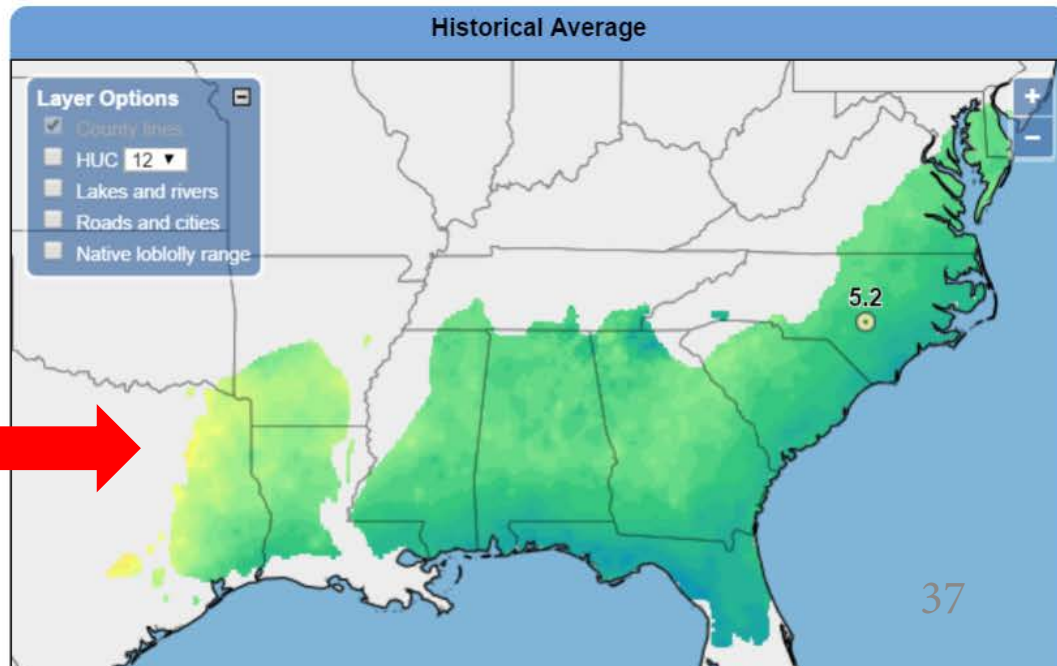
Summer droughts affect stand productivity, so at any particular location, a change in the Summer Dryness Index should be a useful measure of relative drought stress.

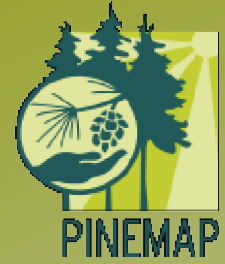


Location:

To select a location, click on the map or enter your coordinates: °N, °W

“Summer droughts affect stand productivity, so at any particular location, a change in the Summer Dryness Index should be a useful measure of relative drought stress.”





Migrating research outputs into the DSS

PINEMAP

DECISION SUPPORT SYSTEM

About

Environment

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Management

Summer Dryness Index

[? About This Tool](#)

Map Display

Historical Observed

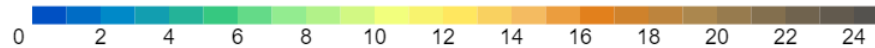
Projected Change

Projected Average

(Historical Observed + Projected Change)

Historical Observed Summer Dryness Index [?](#)

Time Period: 1986 to 2005



Location: In Hoke County, NC (35.06°N 79.1°W)

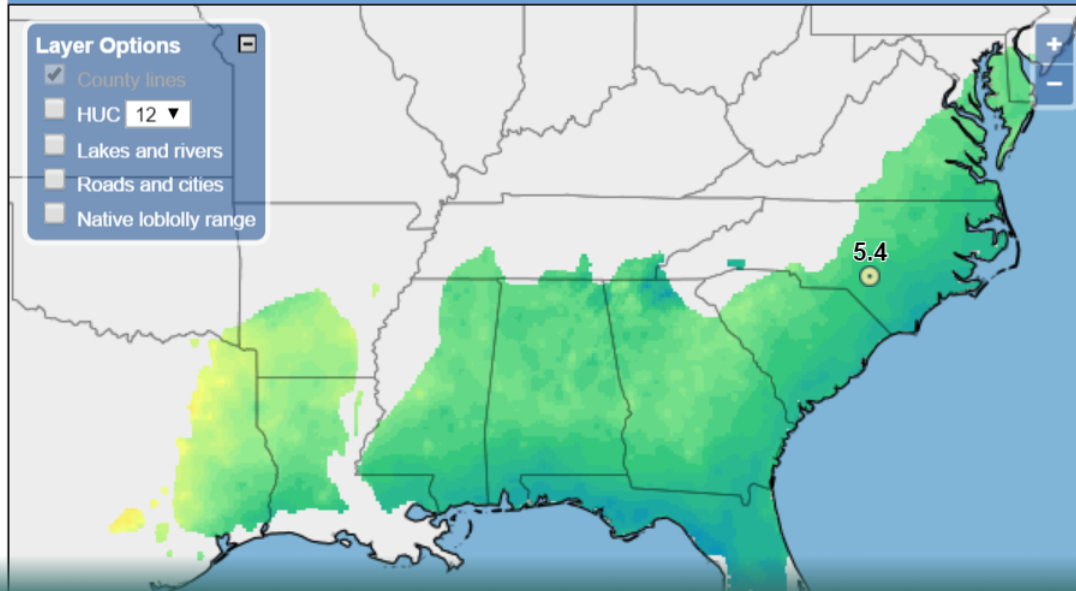
To select a location, click on the map or enter your coordinates: °N, °W

[? Map Help](#)

Historical Average

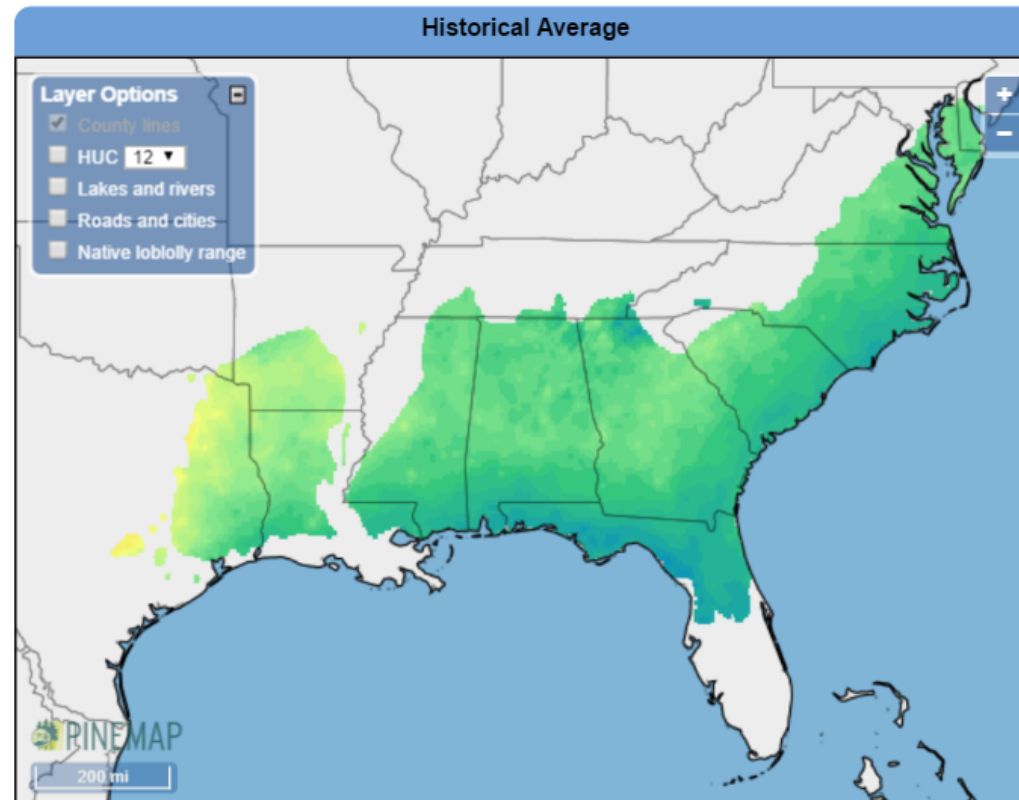
Layer Options

- County lines
- HUC 12 ▾
- Lakes and rivers
- Roads and cities
- Native loblolly range





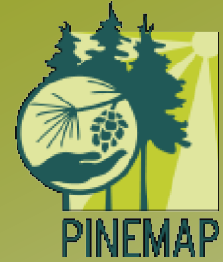
Migrating research outputs into the DSS



Other Resources

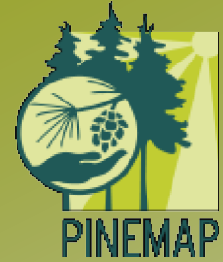
- [Background: MACA Statistical Downscaling](#)
- [Analysis Tips: MACA Statistical Downscaling](#)
- [Sabatia, Charles O., and Harold E. Burkhart \(2014\) Predicting site index of plantation loblolly pine fr](#)

For more information on the Summer Dryness Index, contact [Dr. Harold Burkhart](#) at Virginia Tech University



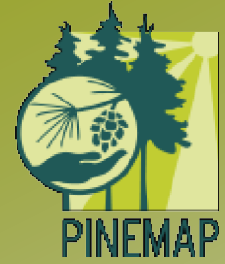
Migrating research outputs into the DSS

- Additional items we need from you:
 - **Limitations/caveats**
 - **Data format**
 - NetCDFs, Shapefiles, CSVs 😊
 - **Files needed**
 - Historical average, projected change, projected average, model error
 - Model mean and spread required for projected ones



Migrating research outputs into the DSS

- Handout to be shared post-meeting
- How long will this take?
 - It depends but in general, few days to few weeks
 - Challenges: data format, communicating results to users



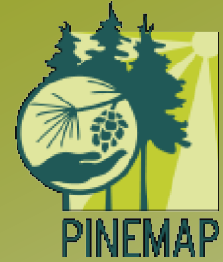
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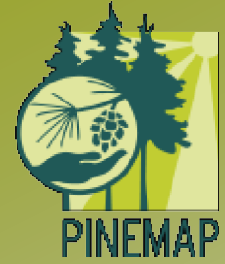
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Agriculture



Long-term plans

- DSS visualization is innovative
- Committed to long-term support
- Tailoring for mobile devices
- Site-level report summaries



BREAK for questions/discussion